Government of Canada | Gouvernement du Canada

2018

Discussion paper on the mid-term evaluation of the Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations

Canada

Cat. No.: En14-328/2018E-PDF
ISBN: 978-0-660-27397-6

Unless otherwise specified, you may not reproduce materials in this publication, in whole or in part, for the purposes of commercial redistribution without prior written permission from Environment and Climate Change Canada's copyright administrator. To obtain permission to reproduce Government of Canada materials for commercial purposes, apply for Crown Copyright Clearance by contacting:

Environment and Climate Change Canada
Public Inquiries Centre
7th Floor, Fontaine Building
200 Sacré-Coeur Boulevard
Gatineau QC K1A 0H3
Telephone: 819-997-2800
Toll Free: 1-800-668-6767 (in Canada only)
Email: ec.enviroinfo.ec@canada.ca

Cover photo: © GettyImages.ca
Inside photos: © Environment and Climate Change Canada

© Her Majesty the Queen in Right of Canada, represented by the Minister of Environment and Climate Change, 2017

Aussi disponible en français

CONTENTS

1. INTRODUCTION 1

1.1. Overview of Canada's regulations 2

2. U.S. MID-TERM EVALUATION PROCESS 3

2.1. Background 3

2.2. Recent developments 4

2.3. Canadian involvement in U.S. mid-term evaluation 5

3. KEY FACTORS AFFECTING CANADA'S MID-TERM EVALUATION 5

3.1. Canada's Paris Agreement target 6

3.2. Canada's Pan-Canadian Framework on Clean Growth and Climate Change (PCF) 7

3.3. Fuel prices in Canada and the impact on vehicle choice 7

3.4. Federal and provincial efforts on zero emission vehicles 9

3.5. Canada-specific incentives under the existing regulations 10

4. EVOLUTION OF CANADIAN VEHICLE MARKET AND COMPLIANCE WITH EXISTING REGULATIONS 11

4.1. Sales, fleet turnover, rebound and market share 12

4.2. All-wheel drive 15

5. KEY CONSULTATION QUESTIONS 16

6. CONSULTATION PLAN AND TIMELINES 17

6.1. How to submit comments 17

1. INTRODUCTION

Canada pledged to reduce national greenhouse gas emissions by 30% below 2005 levels by 2030 as part of its commitments made under the Paris Agreement. The Government's efforts to meet this commitment are being pursued through the implementation of the Pan-Canadian Framework on Clean Growth and Climate Change. Implementing increasingly stringent standards under the Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations is one component of the Government's plan to meet this target.

Environment and Climate Change Canada is consulting with provinces, territories, Indigenous Peoples, industry, NGOs and other stakeholders, on Canada's mid-term evaluation of the 2022 to 2025 model year standards under the regulations. The mid-term evaluation aims to determine whether the greenhouse gas emission standards for the 2022 to 2025 model years remain appropriate for Canada.

The purpose of this discussion paper is to facilitate consultations by seeking early views on factors to be considered when assessing the appropriateness of the Canadian requirements. In recognition of the particularly long time frame associated with setting standards for the 2022 to 2025 model years, the department committed, in the Regulatory Impact Analysis Statement that accompanied Canada's amendments published in 2014, to conduct a Canada-specific mid-term evaluation in consultation with stakeholders.

Canada's regulations are currently aligned with the U.S. Environmental Protection Agency Standards for model years 2017 to 2025. The U.S. Environmental Protection Agency conducted its own mid-term evaluation and on April 2, 2018, made a final determination that the standards set for model years 2022 to 2025 were not appropriate.

Canada has a long history of aligning its vehicle emission standards with those of the U.S. Environmental Protection Agency. This approach has provided efficiencies for industry and supported the competitiveness of Canadian manufacturers given the integrated nature of vehicle manufacturing and trade in the North American market. Today, Canada's automotive industry is largely defined by its integration within a North American market, and in particular with the U.S. As a result, the trading relationship with the U.S. is paramount to the competitiveness of North American automotive manufacturing. Policies that could have implications for the integrated nature of the market, including this mid-term evaluation of the light-duty vehicle greenhouse gas emission regulations, will take these and broader competitiveness issues into account.

The department is proposing to assess a number of factors through this process, including analysis of manufacturer compliance with standards of the 2011 to 2016 model years and assessments of how economic and policy factors have evolved since the amendments to the regulations were published in 2014. Some of these economic and policy factors include updated fuel price forecasts, the conclusion of the Paris Agreement in 2015, a shift in consumer purchase preferences from cars to light trucks, the Government's commitment to develop a national Zero Emission Vehicle Strategy, the Pan-Canadian Framework commitment to price carbon pollution, and Quebec's publication of the Regulation Respecting the Application of the Act to Increase the

Number of Zero-Emission Motor Vehicles in Québec in Order to Reduce Greenhouse Gas and Other Pollutant Emissions.

This discussion paper highlights key details of the U.S. process, identifies new Canadian factors that have emerged since amendments to the regulations were published in 2014, describes how the Canadian light-duty vehicle market has evolved since the 2011 model year, and poses questions related to how these items should be considered as part of the Canadian mid-term evaluation process.

A determination of whether the established greenhouse gas emission standards for the 2022 to 2025 model years remain appropriate for Canada will be informed by this mid-term evaluation process and careful consideration of environmental and economic impacts to industry and consumers.

The department is monitoring the U.S. regulatory amendment process that is underway, the actions of California and other U.S. states as well as many other global jurisdictions that are also developing measures to address greenhouse gas emissions from light-duty vehicles. If the department determines that amendments to Canada's regulations are warranted, a regulatory development process will be initiated and interested parties will have further opportunity to provide comments.

1.1. OVERVIEW OF CANADA'S REGULATIONS

The regulations establish greenhouse gas emission standards for new light-duty on-road vehicles offered for sale in Canada and took effect with model year 2011. These regulations require importers and manufacturers of new vehicles to meet fleet average greenhouse gas emission standards. The regulations were amended in 2014 to establish greenhouse gas emission standards for the 2017 to 2025 model years. Canada's regulations incorporate U.S. Environmental Protection Agency requirements by reference.

The regulations establish progressively more stringent greenhouse gas emission standards over the 2011 to 2025 model years for both passenger automobiles and light trucks. The applicable emission standards are company-unique insofar that they are a function of the footprint[1] and the quantity of vehicles offered for sale. A company's actual performance is determined through its sales-weighted fleet average emissions performance for a given model year, expressed in grams per mile of CO_2 equivalent based on standardized emissions tests. The emissions measured during these test procedures include CO_2 and other carbon related combustion products, namely carbon monoxide (CO) and hydrocarbons (HC), collectively referred to as the vehicle's carbon-related exhaust emissions or CREE. The regulations also set limits for the release of other greenhouse gases such as methane (CH_4) and nitrous oxide (N_2O). The regulations contain mechanisms which provide companies with options and flexibilities to achieve compliance with the applicable greenhouse gas emission standards in a cost-effective way, such as recognizing the benefit of technologies which reduce emissions in ways that are not captured during standard emissions testing (such as active aerodynamic devices, use of

[1] **Footprint is defined as "the result of the product of the average width (measured in inches and rounded to the nearest tenth of an inch) of the lateral distance between the centrelines of the front and rear base tires at ground, multiplied by the longitudinal distance between the front and rear wheel centrelines (measured in inches and rounded to the nearest tenth of an inch), divided by 144 and rounded to the nearest tenth of a square foot. (empreinte)"**

lower global-warming potential refrigerants in air conditioning units). The regulations also contain flexibilities which incentivize the deployment of advanced technologies such as plug-in hybrid and battery electric vehicles.

The emission standards for model years 2017 to 2025 require improvement in the CO_2 equivalent emission performance of passenger cars by approximately 5% per year, and require improvement in the CO_2 emission performance of light trucks by approximately 3.5% per year from 2017 to 2021 and 5% per year from 2022 to 2025.

2. U.S. MID-TERM EVALUATION PROCESS

2.1. BACKGROUND

In the United States, the National Highway Traffic and Safety Administration has regulated corporate average fuel economy (CAFE) since the 1970s. In 2007, the U.S. Supreme Court ruled that greenhouse gases emissions could be regulated under the Clean Air Act if the Administrator of the U.S. Environmental Protection Agency found that such emissions could reasonably endanger the public health and welfare. In December 2009, the U.S. Environmental Protection Agency Administrator signed two formal findings, namely: (1) that the current and projected concentrations of six key greenhouse gases in the atmosphere threaten the public health and welfare of current and future generations; and (2) that the combined emissions of these greenhouse gases from new motor vehicles and new motor vehicle engines contribute to greenhouse gas pollution which threatens public health and welfare. On May 7, 2010, the National Highway Traffic and Safety Administration and the U.S. Environmental Protection Agency published a joint final rule in which the U.S. Environmental Protection Agency established greenhouse gas emission standards for light-duty vehicles of the 2012 to 2016 model years and the National Highway Traffic and Safety Administration established aligned fuel economy standards for vehicles of those same model years. In addition, the two agencies published a joint final rule on October 15, 2012 that established greenhouse gas and fuel economy standards for light-duty vehicles of the 2017 to 2021 model years. The U.S. Environmental Protection Agency's greenhouse gas emission standards were established to include model years 2022 to 2025. However, the National Highway Traffic and Safety Administration's enabling legislation prevents them from establishing fuel economy standards for more than 5 years at a time. Given this, the National Highway Traffic and Safety Administration formally established standards for the 2017 to 2021 model years only and published notional standards for the 2022 to 2025 model years, which were to be formalized in a future rulemaking.

The U.S. Clean Air Act provides the U.S. Environmental Protection Agency's Administrator the authority to issue waivers to the state of California allowing the state to be exempt from the provision that prohibits states from adopting and enforcing their own emission standards for new motor vehicles. Once such a waiver is granted to California, other states may adopt California's standards under Section 177 of the Clean Air Act (these states are sometimes referred to as Section 177 states). On July 8, 2009, California was granted a waiver to enforce its

own greenhouse gas emission standards for new light-duty vehicles of model years 2009 and beyond. California aligned its standards with equivalent 2012-2025 federal greenhouse gas standards to create a single national program, including a provision in which manufacturers are "deemed-to-comply" with California's standards if they comply with the federal standards.

As part of the 2012 rulemaking process, Environmental Protection Agency and the National Highway Traffic and Safety Administration both committed to conduct a mid-term review process. This review would use the most recent data on the U.S. automotive sector to determine whether the standards for model years 2022 to 2025 remained appropriate for the United States. The process was to be completed no later than April 1st of 2018.

2.2. RECENT DEVELOPMENTS

A draft Technical Assessment Report, jointly authored by the U.S. Environmental Protection Agency, the National Highway Traffic and Safety Administration and the California Air Resources Board, was published in July of 2016[2]. The U.S. Environmental Protection Agency published a Proposed Determination in November of 2016 stating that the standards were appropriate and should remain unchanged[3], and published a Final Determination in January of 2017 which reached the same conclusion. The department, along with the National Highway and Traffic Safety Administration, and the California Air Resources Board, provided support for the U.S. Environmental Protection Agency's mid-term evaluation process including partnerships and technical studies relevant to both countries, which were referenced in the U.S. Draft Technical Assessment Report and other U.S. regulatory documents.

In March of 2017, the mid-term evaluation was resumed, and on April 2nd, 2018, the Administrator of the U.S. Environmental Protection Agency signed a new Final Determination stating that the passenger vehicle and light truck standards were not appropriate and that the U.S. Environmental Protection Agency would begin a new rulemaking process to amend the requirements for model years 2022 to 2025. In the Final Determination notice, the Environmental Protection Agency Administrator stated that the agency needed to obtain additional information on a group of factors to inform the development of proposed regulatory amendments, which include:

- The availability, effectiveness and lead time of technologies
- The costs to vehicle producers and purchasers of new motor vehicles
- The feasibility and practicality of the standards
- The impact of the standards on reducing emissions, oil conservation, energy security and consumer fuel savings
- The impact of the standards on the automotive industry
- The impact of the standards on vehicle safety

---

[2] U.S. Environmental Protection Agency. Draft Technical Assessment Report: Midterm Evaluation of Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for Model Years 2022-2025. November 2016. P. ES-1

[3] U.S. Environmental Protection Agency. Proposed Determination on the Appropriateness of the Model Year 2022-2025 Light-Duty Vehicle Greenhouse Gas Emissions Standards under the Midterm Evaluation. November 2016. P. ES-1

- The impact of the standards on the CAFE program and a national harmonized program

In March of 2017, California concluded its own Advanced Clean Cars Midterm Review and determined that the original standards established in 2012 remain appropriate for California[4]. Thirteen other states have adopted California's greenhouse gas emission standards for light-duty vehicles of the 2022-2025 model years[5] as permitted by Section 177 of the Clean Air Act.

2.3. CANADIAN INVOLVEMENT IN U.S. MID-TERM EVALUATION

The standards for greenhouse gas emissions from light-duty vehicles of model years 2017 to 2025 were developed in cooperation with the U.S. Environmental Protection Agency, continuing a harmonized Canada-United States regulatory approach. The alignment approach is consistent with the Regulatory Cooperation Council's Joint Action Plan, which establishes an enhanced level of regulatory cooperation and alignment between Canada and the United States.

Environment and Climate Change Canada, in cooperation with Transport Canada and the National Research Council of Canada, initiated and contributed research and testing results that were shared with the technical automotive community, including the U.S. Environmental Protection Agency. The research and testing includes studies on aerodynamics, vehicle light weighting and safety analysis, all-wheel drive systems, and forecasting of compliance trends; some of these studies were referenced in the U.S. Environmental Protection Agency's draft Technical Assessment Report.

The department continues to work with Transport Canada and the National Research Council of Canada to conduct research and testing to inform the Canadian mid-term evaluation.

3. KEY FACTORS AFFECTING CANADA'S MID-TERM EVALUATION

The Canadian light-duty vehicle market has continued to evolve since the regulations were published in 2014. The department is considering how various factors influence the appropriateness of Canada's standards for light-duty vehicles of the 2022 to 2025 model years.

Specific factors being considered in the Canadian context include:

- Canada's Paris Agreement target to reduce economy-wide greenhouse gas emissions by 30% below 2005 levels by 2030;
- Canada's Pan-Canadian Framework on Clean Growth and Climate Change and initiatives directed at reducing greenhouse gas emissions, including Canada's Clean Fuel Standard and commitment to price

---

[4] California Air Resource Board. California's Advanced Clean Cars Midterm Review Summary Report for the Technical Analysis of the Light Duty Vehicle Standards. 18 January 2017. P. ES-3-ES-4

[5] At the time of writing, the states that have adopted California's light-duty GHG standards are Connecticut, Delaware, Maine, Maryland, Massachusetts, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington State, with Colorado indicating an intention to become the 14th state to adopt these standards

carbon pollution;

- The integrated nature of vehicle manufacturing and trade in the North American market;
- Fuel prices in Canada and the impact on vehicle choice;
- Federal and provincial efforts to increase the number of zero emission vehicles in Canada;
- The pace of technological advancement in the light-duty vehicle market;
- Canada-specific provisions under the existing regulations to encourage advanced technologies; and
- The evolving composition of the Canadian fleet (see section 4 below).

3.1. CANADA'S PARIS AGREEMENT TARGET

On December 12, 2015, Canada and 194 other countries reached the Paris Agreement. As part of this agreement, Canada committed to reducing net greenhouse gas emissions by 30% below 2005 levels by 2030. Light-duty vehicles account for about 11% of Canada's total greenhouse gas emissions and Canada is continuing to pursue reductions in emissions in order to meet this commitment. The Canadian government continues to look for opportunities to reduce greenhouse gas emissions across the transportation sector and will consider Canada-specific requirements to maximize the benefits to Canada's environment and economy.

Canada's third biennial report on climate change was submitted to the United Nations Framework Convention on Climate Change in 2017 and projects that greenhouse gas emissions from the transportation sector in Canada will fall from 173 Mt CO_2eq in 2015 to 155 Mt CO_2eq by 2030. Light-duty vehicle emissions in particular are projected to fall from 83 Mt in 2015 to 61 Mt in 2030 as seen in Table 1 below. These projections assume that the stringency of the existing standards stay as they are until 2025 and then remain at the 2025 level until 2030.

Table 1: Greenhouse gas emissions from the Canadian transportation sector (historical and projected)

Transportation subsector	2005	2010	2015	2020	2030	Change 2005 to 2030
Passenger Transport	93	92	91	84	69	-24
Cars, Trucks and Motorcycles	85	85	83	76	61	-25
Bus, Rail and Domestic Aviation	7	7	7	8	8	1
Freight Transport	64	73	76	78	79	15
Heavy Duty Trucks, Rail	56	65	71	72	74	18
Domestic Aviation and Marine	8	8	5	5	5	-3
Others: Recreational, Commercial and Residential	7	7	6	7	8	1
Total	**163**	**171**	**173**	**168**	**155**	**-8**

Note: Numbers may not sum due to rounding

3.2. CANADA'S PAN-CANADIAN FRAMEWORK ON CLEAN GROWTH AND CLIMATE CHANGE (PCF)

The Pan-Canadian Framework on Clean Growth and Climate Change was agreed to by first ministers in December 2016 and represents a collective federal-provincial-territorial plan to grow the Canadian economy while reducing emissions and building resilience to adapt to a changing climate. The approach to transportation will include (1) setting and updating vehicle emissions standards and improving the efficiency of vehicles and transportation systems; (2) expanding the number of zero-emission vehicles on Canadian roads (ZEV Strategy); (3) supporting the shift from higher to lower-emitting types of transportation, including investing in infrastructure such as electric vehicle charging stations; and (4) using cleaner fuels.

The mid-term evaluation is focused on the greenhouse gas emission standards for new light-duty vehicles of the 2022 to 2025 model years, which will drive emissions reductions. By 2030, annual greenhouse gas emissions in 2030 are expected to be about 7 million tonnes lower as a result the standards for these vehicles.

The Government of Canada is committed to developing a Clean Fuel Standard that will reduce carbon emissions from all fuels by 30 million tonnes in 2030. The standard works by setting lifecycle carbon intensity requirements for liquid, gaseous and solid fuels used in transportation, industry and buildings that become more stringent over time. Using lower-carbon fuels in transportation, industry and buildings is one of the biggest steps we can take to reduce carbon pollution and make our economy cleaner and more competitive. Since announcing the policy in late 2016, Environment and Climate Change Canada has engaged broadly and listened to stakeholders about the design of the policy and the need to work with interested parties to conduct robust technical and economic analysis to ensure that the Clean Fuel Standard achieves its goal while maintaining Canadian competitiveness. Environment and Climate Change Canada recently announced that it is taking a phased approach to develop the Clean Fuel Standard, starting with the proposed regulations for the liquid fuel stream in spring to summer 2019 and final regulations in 2020. Proposed regulations for the gaseous and solid fuel streams will follow in the fall of 2020, and final regulations in 2021. The standards for liquid fuels, such as diesel and gasoline, will come into force by 2022 and will support the transition to lower-carbon fuels, encourage growth in the low-carbon fuel industry and reduce lifecycle GHG emissions.

Another element of the Pan-Canadian Framework is pricing carbon pollution to create a price signal for fuels in order to shift consumption and encourage more efficient use of fuels (such as more efficient vehicles) and less carbon intensive forms of energy.

3.3. FUEL PRICES IN CANADA AND THE IMPACT ON VEHICLE CHOICE

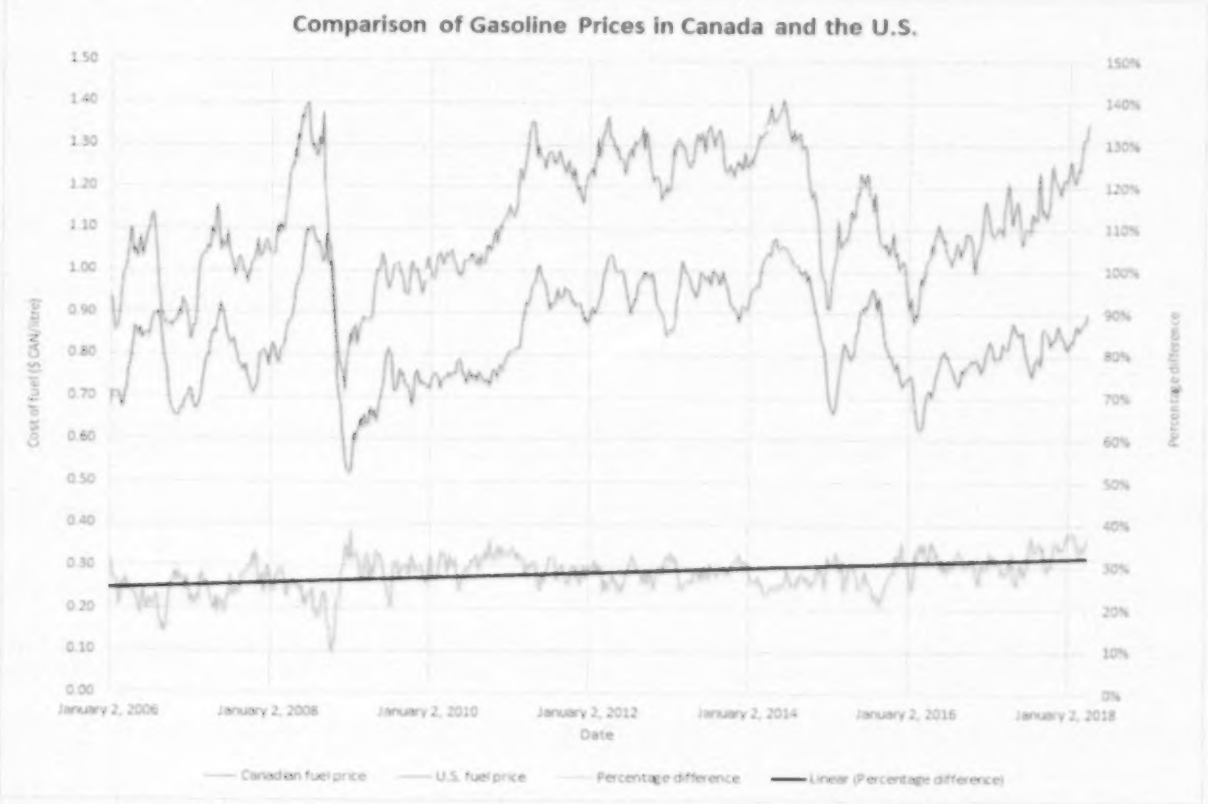
Fuel prices have a significant effect on the market share of different vehicle types and consumer desire to purchase lower emitting vehicles. In general, past periods of high fuel prices have resulted in increased sales of smaller, more fuel efficient vehicles and faster growth in sales of advanced powertrain technologies such as hybrid and electric vehicles. Conversely, recent periods of low fuel prices have tended to result in slower

---

7 Discussion paper on the mid-term evaluation of the Passenger Automobile and Light Truck Greenhouse Gas Emission Regulations

growth in sales of advanced powertrain technologies and greater consumer desire for larger vehicles. Historically, Canadian fuel prices have been higher than U.S. prices although fuel prices tend to fluctuate by similar magnitudes in both markets. Though fuel prices have historically moved in similar directions, the gap between Canadian and U.S. fuel prices has widened and this trend of widening price differentials is likely to continue. Figure 1 below shows historical gasoline price differences between Canada and the U.S in $/L CAD, and accounts for the exchange rate between the Canadian and U.S. dollar.

Figure 1: Comparison of gas prices in Canada and the U.S., data retrieved from Natural Resources Canada, U.S. Energy Information Administration, and historical exchange rates (OFX)



Fuel prices are an important consideration when analyzing the payback time of advanced technologies. In an effort to reduce fuel consumption, manufacturers may opt to utilize advanced technologies such as engine stop-start, electrification, and advanced aerodynamics in their vehicles. The cost of implementing such technologies is passed on to consumers, as are the long-term monetary savings from reduced fuel consumption. Higher fuel prices will result in consumers recouping the costs of fuel saving technologies more quickly, while lower fuel prices will require longer timeframes for monetary savings from reduced fuel consumption to offset the initial cost increase associated with fuel saving technologies. The Regulatory Impact Analysis Statement that accompanied the publication of the amended regulations in 2014 estimated that the monetary savings generated through lower fuel consumption would pay back the increased cost of fuel saving technologies within 2 to 4 years (depending on vehicle segment).

3.4. FEDERAL AND PROVINCIAL EFFORTS ON ZERO EMISSION VEHICLES

Electric vehicles are steadily gaining market share throughout Canada and help manufacturers comply with the regulations. Investments by automakers to develop an increasing variety of electric vehicles, financial incentives from Quebec and British Columbia (and until very recently, from Ontario), and recent investments in charging infrastructure by the federal and provincial governments and the private sector have contributed to these sales increases. Though sales are increasing year over year, in the 2016 model year plug-in electric vehicles (including plug-in hybrids) accounted for approximately 0.5% of new vehicle sales in Canada and 1.0%[6] in the U.S. Trade publications indicate that zero emission vehicle sales have continued to increase in both countries in 2017 and 2018. When the regulations were published in 2014, the Regulatory Impact Analysis Statement estimated that in 2025, the new vehicle fleet would contain 2-4% battery electric and plug-in hybrid electric vehicles.

The Pan-Canadian Framework included a commitment that federal, provincial, and territorial governments would work with industry and other stakeholders to develop a Canada-wide strategy to increase the deployment of zero-emission vehicles. A federal, provincial and territorial zero-emission-vehicle steering group was established and charged with developing options for jurisdictions to consider. To support its work, the Steering Group created a zero-emission-vehicle advisory group made up of representatives from governments, industry, non-governmental organizations, and academia. Groups of experts also conducted detailed analyses of the challenges and opportunities within the areas of vehicle supply, infrastructure readiness, costs and benefits of ownership, public awareness and education, and clean growth and jobs. The results of this work are now being considered by the federal, provincial and territorial governments as they work to finalize a zero-emission vehicle strategy. The work being undertaken for the zero-emission vehicle strategy is separate from the Canadian mid-term evaluation; however, impacts that the zero-emission vehicle strategy could have on the Canadian fleet are being considered in the Canadian mid-term evaluation.

The Government of Canada continues to support the expansion of electric vehicle charging infrastructure. Budget 2016 and 2017 both included funding to support electric vehicle charging infrastructure. In Budget 2016, the government committed $62.5 million for 102 electric vehicle fast-chargers, 3 hydrogen refueling stations and more than 200 next-generation electric vehicle charging stations. In Budget 2017, investment continued to further expand the coast-to-coast network of electric vehicle charging stations across Canada with $120 million committed to the expansion.

Provinces are also taking action to encourage the uptake of zero-emission vehicles. Quebec and British Columbia have purchase rebate programs in place (as did Ontario until recently) and all three provinces have made substantial investments in charging infrastructure to support the uptake of zero-emission vehicles. In 2017, Quebec published the Regulation Respecting the Application of the Act to Increase the Number of Zero-Emission Motor Vehicles in Québec in Order to Reduce Greenhouse Gas and other Pollutant Emissions, which

[6] https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100TGDW.pdf

requires manufacturers to generate zero emission vehicle credits through the sale or lease of plug-in hybrid and battery electric vehicles. British Columbia has also developed the first provincial Renewable and Low Carbon Fuel Requirements Regulation that is designed to provide incentives for lower carbon fuels to be supplied at the expense of high carbon fuels. In addition, British Columbia recently published an intentions paper on clean transportation that lays out the province's plan for the growth of clean transportation, including potential regulatory measures to increase sales of new zero-emission vehicles.

3.5. CANADA-SPECIFIC INCENTIVES UNDER THE EXISTING REGULATIONS

Under the federal light-duty vehicle regulations, battery electric vehicles and fuel cell vehicles are incented and are considered to emit 0 grams/mile of CO_2 (until certain sales thresholds are reached). In addition, companies may, for the purpose of calculating their fleet average carbon-related exhaust emission values, multiply the total number of advanced technology vehicles (electric vehicles, plug-in hybrid electric vehicles and fuel cell vehicles) in their fleets by the factors indicated in Table 2 below. These factors are dependent on the technology of the vehicle and the model year in which it was manufactured or imported. The objective of the multipliers is to encourage the early deployment of advanced technology vehicles.

Due to the lower greenhouse gas intensity of Canada's electricity grid and in an effort to encourage greater penetration of electrified vehicles, the Canadian regulations offer multipliers that are generally 0.5 times higher than multipliers in the comparable U.S. rule. Table 2 below shows the differences in multipliers for electric, fuel cell, and plug-in hybrid vehicles.

Table 2: Advanced technology multipliers for 2017 to 2025 model year vehicles

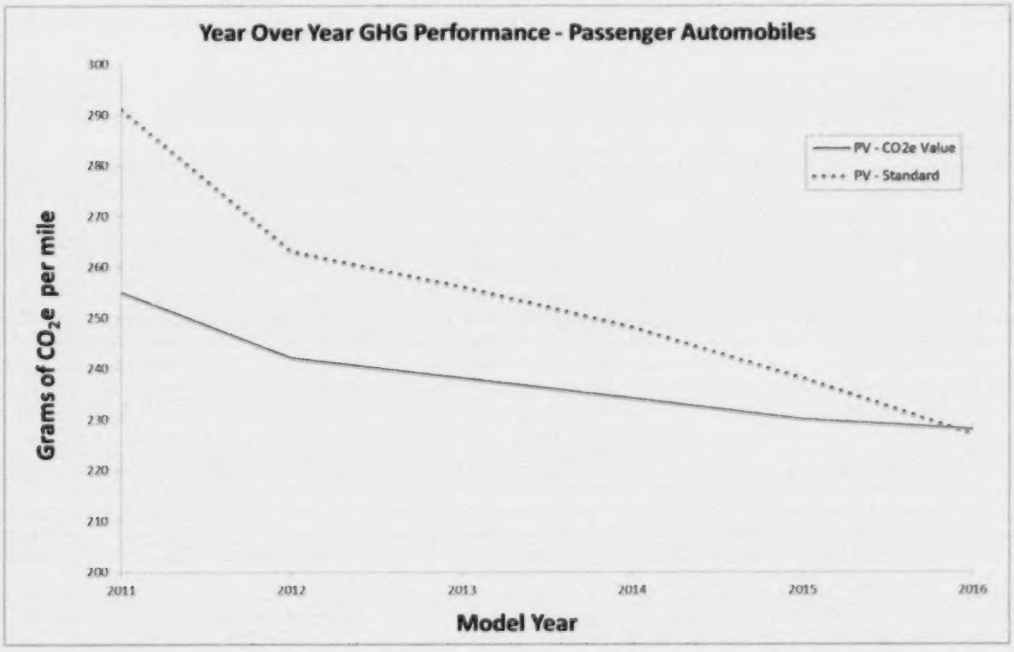
Model year	Electric and fuel cell vehicle multiplier		Plug-in hybrid vehicle multiplier	
	Canadian multiplier	U.S multiplier	Canadian multiplier	U.S multiplier
2017	2.5	2.0	2.1	1.6
2018	2.5	2.0	2.1	1.6
2019	2.5	2.0	2.1	1.6
2020	2.25	1.75	1.95	1.45
2021	2.0	1.5	1.8	1.3
2022	1.5	N/A	1.3	N/A
2023	1.5	N/A	1.3	N/A
2024	1.5	N/A	1.3	N/A
2025	1.5	N/A	1.3	N/A

4. EVOLUTION OF CANADIAN VEHICLE MARKET AND COMPLIANCE WITH EXISTING REGULATIONS

The Greenhouse Gas Emissions Performance for the 2011 to 2016 Model Year Light-Duty Vehicle Fleet report was published on the Canadian Environmental Protection Act Registry on August 20, 2018[7]. The report summarizes the fleet average greenhouse gas emission performance of the Canadian fleet of light-duty vehicles of the 2011 to 2016 model years. The report provides a compliance summary for each company that manufactures or imports new vehicles in Canada, including their individual fleet average carbon dioxide equivalent emissions value and their emission credit balance under the regulations.

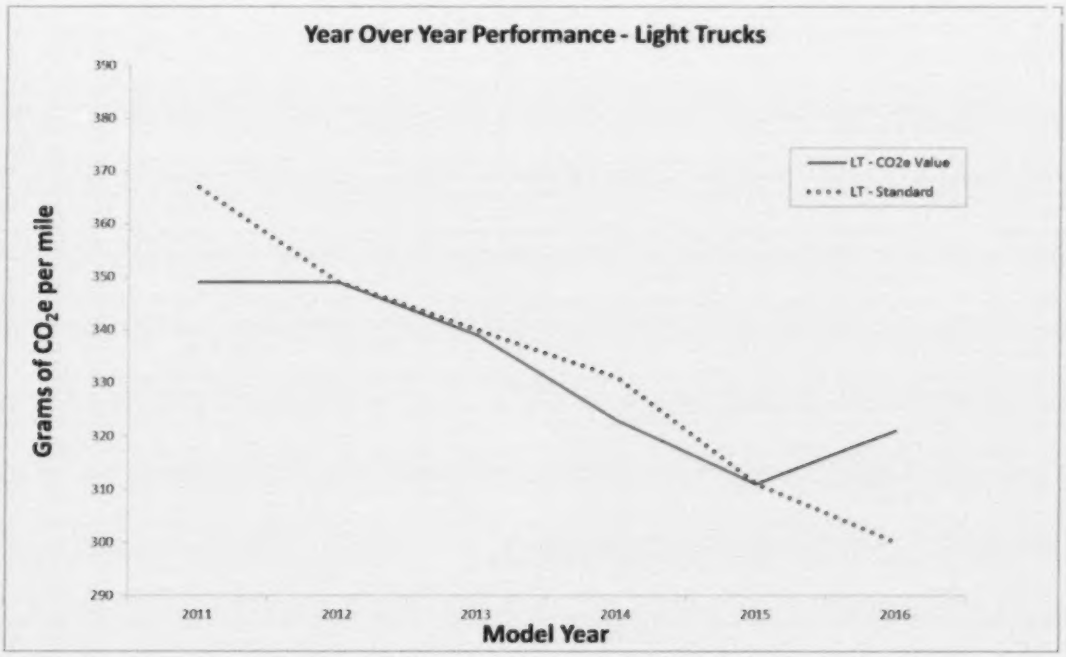
The report indicates that all companies continue to comply with the regulations through the 2016 model year. However, when all regulated manufactures are consolidated, as seen in Figure 2 and Figure 3 below, 2016 was the first year where the industry-wide fleet average compliance values exceeded the industry-wide fleet average standard for both light-trucks and passenger cars. Companies whose compliance value exceeded their standard remained in compliance by using credits that had been accumulated by over-complying with standards in previous model years. More details on company specific credit balances and transfers of credits between companies can be found in the 2016 performance report.

Figure 2: Year over year greenhouse gas emission performance of passenger automobiles



[7] **This report, along with the 2014 and 2015 reports, can be found at** https://pollution-waste.canada.ca/environmental-protection-registry/regulations/view?Id=104

Figure 3: Year over year greenhouse gas emission performance of light trucks



4.1. SALES, FLEET TURNOVER, REBOUND AND MARKET SHARE

Over the past few years, light-trucks have gained market share while passenger automobiles have lost market share. As of the 2016 model year, the light-truck segment accounted for 53% of new vehicle sales in Canada.

In the regulations a "light truck" is defined as an automobile

(a) that has four-wheel drive or a gross vehicle weight rating of more than 2 722 kg (6,000 pounds) and that has at least four of the following characteristics calculated when the automobile is at curb weight, on a level surface, with the front wheels parallel to the automobile's longitudinal centreline and the tires inflated to the manufacturer's recommended pressure:

(i) approach angle of not less than 28 degrees,

(ii) break-over angle of not less than 14 degrees,

(iii) departure angle of not less than 20 degrees,

(iv) running clearance of not less than 20 centimetres,

(v) front and rear axle clearances of not less than 18 centimetres; or

(b) that is designed to perform at least one of the following functions:

(i) transport more than 10 persons,

(ii) provide temporary living quarters,

(iii) transport property on an open bed,

(iv) provide greater cargo-carrying than passenger-carrying volume, the cargo-carrying volume of

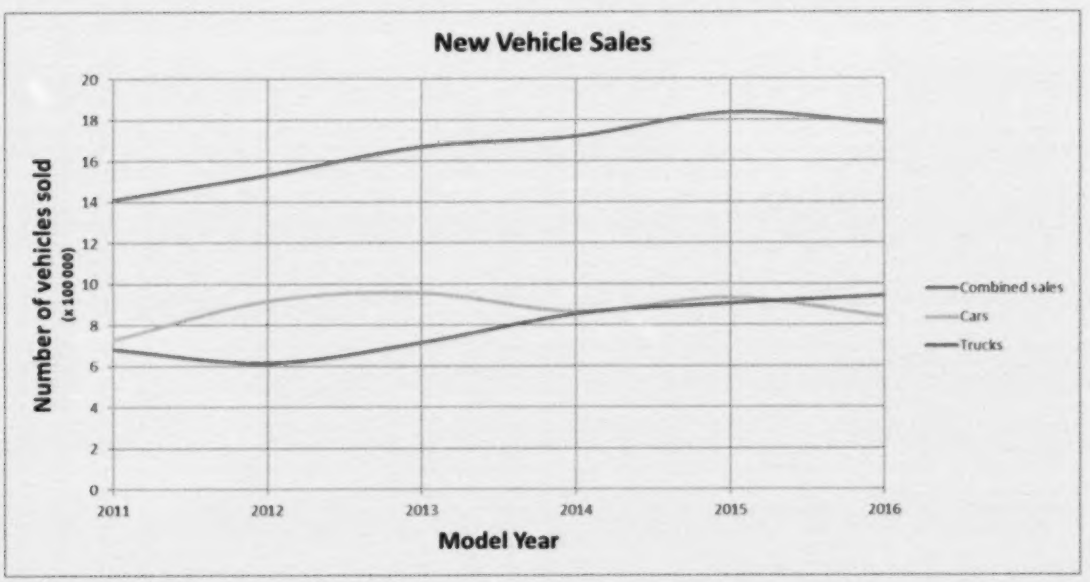
a vehicle sold with a second-row seat being determined with that seat installed, regardless of whether or not the manufacturer has described that seat as optional,

(v) permit expanded use of the automobile for cargo-carrying purposes through the removal or stowing of seats to create a flat surface extending from the forward most point of installation of those seats to the rear of the automobile's interior, with automobiles of the 2012 and subsequent model years being equipped with at least three rows of designated seating positions as standard equipment.

Pickup trucks and minivans in both two-wheel drive and all-wheel drive configurations are normally classified as light trucks. Sedans and hatchbacks in both two-wheel drive and all-wheel drive configurations are normally classified as passenger cars. Crossover vehicles and sport utility vehicles can be classified as light trucks or passenger cars depending on a variety of factors, one of which is drive configuration.

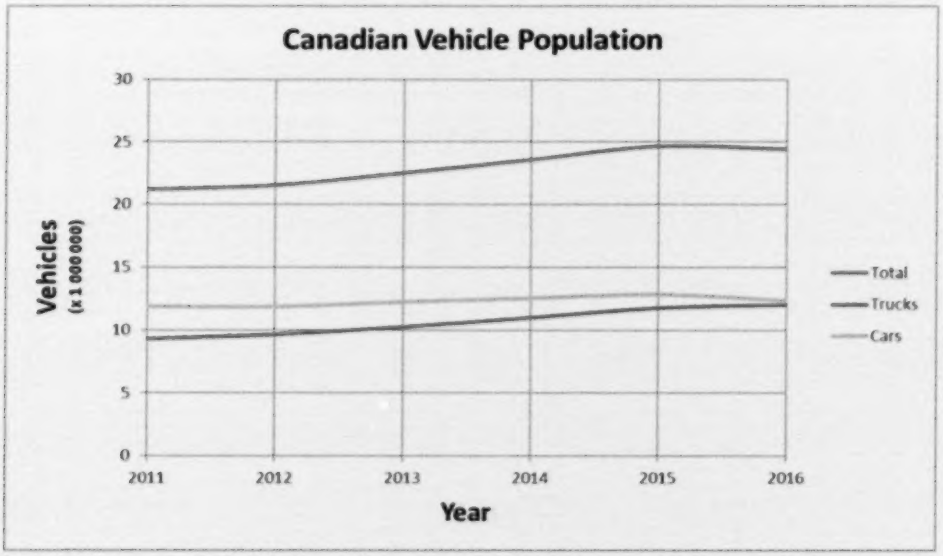
Figure 4 below presents overall sales volumes for light-duty vehicles for the 2011 to 2016 model years, and illustrates that light-duty truck sales volumes have been increasing since the 2012 model year while passenger car sales have fluctuated around a mean value of about 900,000 vehicles. Between the 2015 and 2016 model year, passenger cars had their largest decline in sales (by about 91,000 vehicles), while truck sales continued to increase (by about 36,000 vehicles).

Figure 4: New vehicles sales over time



The total number of light-duty vehicles on Canadian roads has been generally increasing over the 2011 to 2016 calendar years as reported in Canada's National Inventory Report (with a small decrease in the overall vehicle population in 2016). As a result of the sales trends previously discussed, the total population of passenger cars has held relatively steady while the total population of light-trucks has steadily increased, as shown in Figure 5 below.

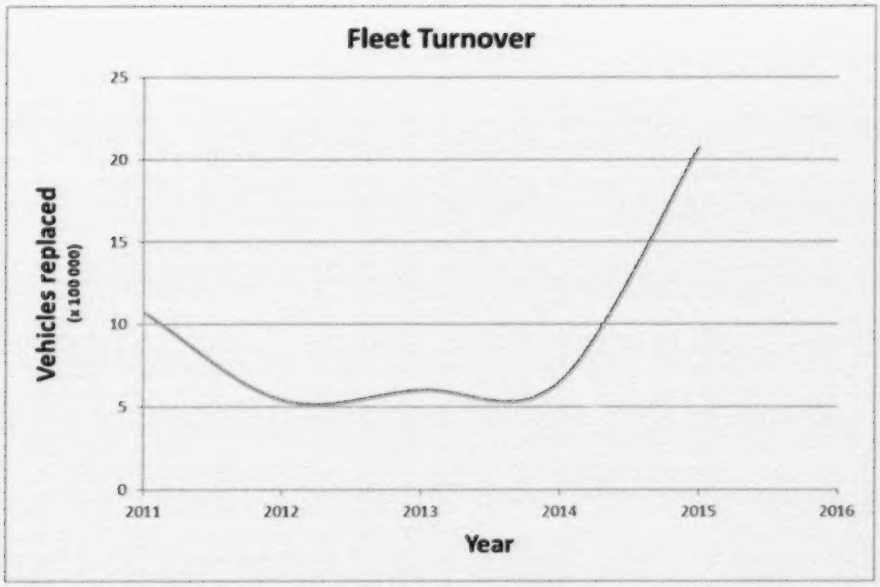
Figure 5: Vehicle population over time



Fleet turnover and rebound are both factors which do not affect new vehicle sales, but do ultimately affect the level of greenhouse gas emissions from light-duty vehicles in Canada, as these factors affect the age of the vehicles which are driven and the number of kilometres driven per year. In general, older vehicles are less efficient than newer vehicles, and thus every kilometre driven in an older vehicle will tend to have higher emissions than every kilometre driven in a newer vehicle. Rebound affects the number of kilometres driven per vehicle. Both of these concepts are explained below and will be considered as part of the mid-term evaluation of Canada's greenhouse gas emission standards for light-duty vehicles.

Fleet turnover is the rate at which older vehicles are retired and replaced by new vehicles. A higher fleet turnover generally results in a reduction in overall greenhouse gas emissions because newer vehicles are generally, though not always, more efficient than the older vehicles they replace. Higher purchase prices tend to slow the rate of new vehicle sales, while the prospect of monetary savings from improved fuel efficiency tends to increase the rate of new vehicle sales. Sales figures from the 2011 to 2016 model years and total vehicle population estimates for the 2011 to 2016 calendar years have been combined to estimate fleet turnover as shown in Figure 6 below. Fleet turnover was relatively steady over 2012 through 2014. The large increase in turnover in 2015 is attributable to a slightly smaller overall Canadian vehicle population in 2016 and near record high vehicle sales.

Figure 6: Fleet turnover over time



For most drivers, a portion of the financial gains from fuel savings is offset by additional driving. This additional driving is commonly known as the rebound effect, and accounts for the increased vehicle use, which typically results from a decrease in travel cost per kilometre. It is also referred to as an elasticity of kilometres driven with respect to fuel cost per kilometre. A 10% rebound rate was used as part of the regulatory impact analysis that accompanied the regulations in 2014.

4.2. ALL-WHEEL DRIVE

All-wheel drive powertrains have been increasing in popularity over the past several model years. The number of vehicles sold with all-wheel drive has increased from 30% of new vehicles sales in 2008 to almost 57% of new vehicle sales in 2016. In the U.S, the number of vehicles with all-wheel drive has increased less substantially from 27% in 2008 to 34% in 2016. In addition to perceived performance and safety advantages of all-wheel drive, the increase in these drivetrains can also be attributed to the slow shift away from passenger cars toward light trucks, including small sport-utility vehicles. Given the regulatory definition of a light-truck in section 4.1, some crossover and sport-utility vehicle models are considered passenger cars in a two-wheel drive configuration and light trucks in an all-wheel drive configuration. Though all-wheel drive variants of a vehicle can have higher greenhouse gas emissions than a two-wheel drive variant due to the additional demands put on the engine, additional weight, and other losses, in some cases all-wheel drive configurations can be beneficial to manufacturers from a compliance perspective because light trucks have less stringent target values than passenger cars with equivalent footprints.

5. KEY CONSULTATION QUESTIONS

Canada has a history of aligning its vehicle emission standards with those of the U.S. Environmental Protection Agency. Given that vehicle manufacturing and distribution are highly integrated across the North American market, this approach has provided efficiencies for industry and supported the competitiveness of Canadian manufacturers. Since the U.S. Environmental Protection Agency standards have traditionally been leading-edge, this approach has also provided significant environmental benefits for Canada.

The purpose of the Canadian mid-term evaluation is to determine if the current standards for 2022 to 2025 models years remain appropriate for Canada. As part of this work, the department will be exploring available options to continue reducing greenhouse gases from the transportation sector.

The department is soliciting views and information from interested parties to inform its evaluation of whether the established greenhouse gas emission standards for the 2022 to 2025 model years remain appropriate for Canada. Taking into consideration the factors that affect Canada's mid-term evaluation and the evolution of the Canadian vehicle market, stakeholders are invited to provide input on the following and provide any additional information they consider pertinent.

- What levels of vehicle technology costs and payback timelines are reasonable for compliance with the existing 2022 to 2025 standards?
- Are there any impediments to meeting the estimated levels of electrification (plug-in vehicles) from the 2014 Regulatory Impact Analysis Statement?
- What level of electrification (plug-in vehicles) and hybrid powertrains would be needed to achieve compliance with the existing 2022 to 2025 standards?
- Is the projected greenhouse gas emission reduction contribution of the light-duty vehicle sector towards meeting the government's emission reduction goals reasonable?
- Would compliance with the existing standards for the 2022 to 2025 model years be achievable while maintaining the competitiveness of the Canadian auto industry considering the integrated nature of vehicle manufacturing and trade in the North American market?
- Would the existing standards for the 2022 to 2025 model years provide benefits to consumers and to the public?
- Are there any safety related considerations that should be taken into account?
- Are there changes to existing flexibilities or other new flexibilities that should be considered to facilitate compliance with existing standards while minimizing impacts on expected greenhouse gas emission reductions?
- Are their any emerging trends such as car sharing that need to be taken into account as part of the mid-term evaluation?
- Are there any other factors affecting the light-duty vehicle market that the department should consider as part of the mid-term evaluation?

- Are there any other factors that the department should take into account in considering the outcome of the U.S. mid-term evaluation and the appropriateness of the existing 2022 to 2025 model year standards in Canada?

6. CONSULTATION PLAN AND TIMELINES

This discussion paper solicits preliminary input on key factors relevant to the Canadian mid-term evaluation. Once the factors identified in this document and related stakeholder input have been considered, a determination will be made on the appropriateness of the current standards for the 2022 to 2025 model years in Canada. If it is determined that regulatory amendments are warranted, the department will engage in additional consultations focused on the specific details of possible changes to Canada's greenhouse gas emission standards for light-duty vehicles. During these consultations, Environment and Climate Change Canada will consider developments in the U.S. rulemaking process, summarize the feedback provided via stakeholder responses to this discussion paper and explain how stakeholder feedback was used to inform its evaluation.

6.1. HOW TO SUBMIT COMMENTS

Comments may be submitted to ec.infovehiculeetmoteur-vehicleandengineinfo.ec@canada.ca by September 28, 2018. Submissions should begin with the phrase "Mid-term Evaluation Comment" in the subject line of the email to help ensure they are appropriately tracked and considered.